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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/580,343	05/25/2000	Brigitte Benage	D-6387	8093

7590 10/01/2004

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EXAMINER
THEXTON, MATTHEW

ART UNIT	PAPER NUMBER
1714	

DATE MAILED: 10/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/580,343	BENAGE ET AL.
	Examiner	Art Unit
	Matthew A. Thexton	1714

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 September 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,6-13,16-28,30-44,47,49-56 and 59-125* is/are pending in the application.

4a) Of the above claim(s) *See Continuation Sheet* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,6,9,16,17,30-44,49,52,59,60,73,75-89,122 and 123* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1,4,6-13,16-28,30-44,47,49-56 and 59-125* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *one sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims withdrawn from consideration are 4,7,8,10-13,18-28,47,50,51,53-56,61-72,74,90-121,124 and 125.

DETAILED ACTION

Status of the Claims

Claims 1, 4, 6-13, 16-28, 30-44, 47, 49-56, and 59-125 are pending.

Claims 2, 3, 5, 14, 15, 29, 45, 46, 48, 57, and 58 have been canceled.

Claims 124 and 125 are new and are directed to non-elected species and are therefore withdrawn by the Examiner.

Claims 4, 7, 8, 10-13, 18-28, 47, 50, 51, 53-56, 61-72, 74, 90-121, 124, and 125 are withdrawn from consideration.

Claims 1, 6, 9, 16, 17, 30-44, 49, 52, 59, 60, 73, 75-89, 122, and 123 are subject to consideration.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 6, 9, 16, 17, 30-44, 49, 52, 59, 60, 73, 75-89, 122, and 123 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In the independent claims 1 and 44, Applicant has added the phrase "previously formed in the presence of a nitroxyl inhibitor" (amendment filed 2004 April 29, entered

with Request for Continued Examination filed 2004 May 25) and the phrase "wherein said inhibitor is not present during the formation of the living vinyl aromatic polymer" (presently amended).

Applicant did not indicate in the responses accompanying these amendments where in the originally filed application there is support for the amendments. Review of the application did not discover support for these two limitations, accordingly, the indicated phrases appear to be impermissible new matter.

Claims Analysis

Claim 1, which is independent, and claims 6, 9, and 122, which depend therefrom, require adding the elected inhibitor, DNBP, to a mixture of vinyl aromatic polymer (which was formed in the presence of an inhibitor of the class nitroxyl) and vinyl aromatic monomer. Claim 16 depends from claim 1 and further requires the addition of a transition metal. Claim 17 depends from claim 16 and further specifies the metal to be copper. Claims 30-43 depend from claim 1 or each other and further require the presence of impurities arising from monomer production and/or purification and various typical process conditions such as continuous vacuum distillation and undissolved polymer by product on or in the apparatus; such are notoriously well known and inevitable, as acknowledged by applicant in the background and the references cited in the background.

Claim 44, which is independent, and claims 49, 52, 73, 75, and 123, which depend therefrom, require adding the elected inhibitor, DNBP, and a nitroxyl inhibitor to a mixture of vinyl aromatic polymer (which was formed in the presence of an inhibitor of

the class nitroxyl) and vinyl aromatic monomer. Claim 59 depends from claim 44 and further requires the addition of a transition metal. Claim 60 depends from claim 59 and further specifies the metal to be copper. Claims 76-89 depend from claim 44 or each other and further require the presence of impurities arising from monomer production and/or purification and various typical process conditions such as continuous vacuum distillation and undissolved polymer by product on or in the apparatus; such are notoriously well known and inevitable, as acknowledged by applicant in the background and the references cited in the background.

The new limitations to claims 1 and 44, "previously formed in the presence of a nitroxyl inhibitor" (amendment filed 2004 April 29, entered with Request for Continued Examination filed 2004 May 25) and "wherein said inhibitor is not present during the formation of the living vinyl aromatic polymer" (presently amended) appear to limit the process to sequential addition of the inhibitors, such as adding nitroxyl to monomer, waiting until at least some measurable quantity of polymer forms, and then adding DNBP (alone or with nitroxyl), such as adding nitroxyl to monomer in storage or in transit to distillation, and then adding DNBP (alone or with nitroxyl) into the distillation column.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 6, 9, 30-44, 49, 52, 73, 75-89, 122, and 123 are rejected under 35 U.S.C. 103(a) as obvious over Sutoris et al. (WO 97/46504-A1, as evidenced by US 6143205-A) alone or in view of Foord (US 2225471), Hyde et al. (US 5910232-A), and Lewis et al. (US 5955643-A).

The reference '205 (hereinafter, the US reference will be relied upon) discloses as polymerization inhibitor for ethylenically unsaturated monomers the mixture of DNBP (column 9, line 32, examples) with nitroxyl compounds such as 4-oxo-TEMPO (column 8, line 31). The inhibitor formulation is disclosed to be added to a mixture containing monomer and polymer (item 2. of Examples) in steady state. It is suggested (column 10, lines 4-10) the two components may be added separately. It is well known that the nitroxyl is consumed and must be replaced, while the retarder DNBP is carried off in product streams and the recycle streams do not provide enough back to the column to maintain desirable levels and so it must be added as well. It would have been obvious to one of ordinary skill in the art at the time of the invention to have added the retarder DNBP (alone or mixed with nitroxyl) to the distillation column while adding the nitroxyl alone to the input stream, i.e. before any DNBP, because the retarder is not needed until conditions of the distillation column are encountered, and thus some polymer would have been formed in the presence of nitroxyl and in the absence of DNBP, as required by the new limitations to claims 1 and 44. Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have added the retarder DNBP (alone or mixed with nitroxyl) to any vinyl monomer having some polymer

impurity regardless of whether that polymer was formed in the presence of nitroxyl or some other inhibitor because the prior art discloses the benefits of so doing.

The Foord (column 2, lines 6+), Hyde (column 1, line 42 to column 2, line 14), and Lewis (columns 1-2) references are cited to establish the fact that inhibitors are well known to be of true inhibitor function or of retardation function. It would have been obvious to one of ordinary skill in the art at the time of the invention in view of the known properties of polymerization retarders to add such to mixtures of monomer and polymers (formed in the presence of true inhibitors) in order to slow any further polymerization. The Hyde reference specifically notes that DNBP is a retarder. The Foord reference discloses that nitro groups are effective retarding additives (page 4, column 1, lines 1-5), which would suggest to one of ordinary skill in the art that DNBP would be at least an effective retarder, notwithstanding others effects from the other constituents which are also disclosed to have either inhibiting or retarding effects (page 4, column 1, lines 6-31). The Lewis reference discloses the nitroxyl inhibitors and the dinitrophenols retarders, explaining that the retarders are needed in the distillation column, while the inhibitor is needed all the time in the monomer.

The references suggest using the mixture in purification or distillation processes, including separately and including reduced pressure techniques (e.g., see '205 column 10, lines 4-22). The references discuss the problems of unwanted reactions (polymerization) of monomers in production and purification processes of ethylenically unsaturated monomers. To the extent that the references have not stated the conditions of the claims 30-43 and 76-89, such conditions are considered either

inherent or obvious to one of ordinary skill in the art at the time of the invention when the disclosure is practiced as described. Official notice is taken of the requirement in applicant's claims to the presence of impurities arising from monomer production and/or purification; such are notoriously well known and inevitable, as acknowledged by applicant in the background and the references cited in the background.

Claims 16, 17, 59 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sutoris et al. (WO 97/46504-A1, as evidenced by US 6143205-A) as applied to claims 1 and 44 above, and further in view of Odian and Quintens et al. (US 5372924) and Rosenkranz et al. (US 4053504).

Claims 16 and 59 require the addition of a transition metal.

Claims 17 and 60 further specify the metal to be copper. Odian discloses the use of copper chloride as polymerization inhibitor for ethylenically unsaturated monomers (Table 3-9, page 263). Quintens discloses copper naphthenate as polymerization inhibitor for curable compositions containing ethylenically unsaturated components (paragraph bridging columns 6 and 7). Rosenkranz discloses copper naphthenate as polymerization inhibitor for ethylenically unsaturated monomers (paragraph bridging columns 2 and 3). Individually these references establish that it is known to use copper ion (i.e., in salt form) as polymerization inhibitor for ethylenically unsaturated monomers. It would have been obvious to one of ordinary skill in the art at the time of the invention to employ copper (salt or ion) as an additional polymerization

inhibitor for ethylenically unsaturated monomers because combining additives for their known functions, even in combinations for the same function, is routine.

Claims 1, 6, 9, 30-44, 49, 52, 73, 75-89, 122, and 123 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al. (US 5254760) alone or in view of Foord (US 2225471), Hyde et al. (US 5910232-A), and Lewis et al. (US 5955643-A).

The '760 reference discloses DNBP as polymerization inhibitor for ethylenically unsaturated monomers (column 4, line 12) further formulated with nitroxyl compounds (column 3, lines 3-14 and 32). The inhibitor formulation is disclosed to be added to distillation purification process (paragraph bridging columns 4 and 5), separately, either continuously or intermittently. The reference discloses tests (columns 5 and 6) in which the inhibitor formulation is demonstrated to reduce the amount of formed polymer impurity, but clearly does not eliminate it. Accordingly, when following the suggestion to add DNBP (alone or with nitroxyl) to the distillation column, it would necessarily and inherently be added to polymer which has already formed in the presence of the nitroxyl additive. It would have been obvious to one of ordinary skill in the art at the time of the invention to follow the suggestion to add the components separately and thus to have added the retarder DNBP (alone or mixed with nitroxyl) to the distillation column while adding the nitroxyl alone to the input stream, i.e. before any DNBP, because the retarder is not needed until conditions of the distillation column are encountered, and thus some polymer would have been formed in the presence of nitroxyl and in the absence of DNBP, as required by the new limitations to claims 1 and 44. Furthermore,

it would have been obvious to one of ordinary skill in the art at the time of the invention to have added the retarder DNBP (alone or mixed with nitroxyl) to any vinyl monomer having some polymer impurity regardless of whether that polymer was formed in the presence of nitroxyl or some other inhibitor because the prior art discloses the benefits of so doing.

The Foord (column 2, lines 6+), Hyde (column 1, line 42 to column 2, line 14), and Lewis (columns 1-2) references are cited to establish the fact that inhibitors are well known to be of true inhibitor function or of retardation function. It would have been obvious to one of ordinary skill in the art at the time of the invention in view of the known properties of polymerization retarders to add such to mixtures of monomer and polymers (formed in the presence of true inhibitors) in order to slow any further polymerization. The Hyde reference specifically notes that DNBP is a retarder. The Foord reference discloses that nitro groups are effective retarding additives (page 4, column 1, lines 1-5), which would suggest to one of ordinary skill in the art that DNBP would be at least an effective retarder, notwithstanding others effects from the other constituents which are also disclosed to have either inhibiting or retarding effects (page 4, column 1, lines 6-31). The Lewis reference discloses the nitroxyl inhibitors and the dinitrophenols retarders, explaining that the retarders are needed in the distillation column, while the inhibitor is needed all the time in the monomer.

The references discuss the problems of unwanted reactions (polymerization) of monomers in production and purification processes of ethylenically unsaturated monomers. To the extent that the references have not stated the conditions of the

claims 30-43 and 76-89, such conditions are considered either inherent or obvious to one of ordinary skill in the art at the time of the invention when the disclosure is practiced as described. Official notice is taken of the requirement in applicant's claims to the presence of impurities arising from monomer production and/or purification; such are notoriously well known and inevitable, as acknowledged by applicant in the background and the references cited in the background.

Claims 16, 17, 59 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al. (US 5254760) alone or in view of Foord (US 2225471), Hyde et al. (US 5910232-A), and Lewis et al. (US 5955643-A) as applied to claims 1 and 44 above, and further in view of Odian and Quintens et al. (US 5372924) and Rosenkranz et al. (US 4053504).

Claims 16 and 59 require the addition of a transition metal.

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the time of the invention to employ copper (salt or ion) as an additional polymerization inhibitor for ethylenically unsaturated monomers because combining additives for their known functions, even in combinations for the same function, is routine.

Response to Arguments

Applicant's arguments filed 2004 September 10 have been fully considered but they are not persuasive.

The arguments are believed to have been responded to in the re-statements of rejection hereinabove.

The prior art discloses benefits of employing nitroxyl plus DNBP as compared to each alone. Applicant urges that their method of adding nitroxyl alone to monomer and then permitting some polymerization to occur and then adding DNBP (alone or with more nitroxyl) to the monomer plus polymer is patentable. No benefit is cited by Applicant for Applicant's method of delaying addition of DNBP while adding nitroxyl. No distinction is suggested for a method of adding DNBP (alone or with nitroxyl) to monomer having polymer impurity arising in the presence of nitroxyl as compared to polymer impurity arising in the presence of some other inhibitor.

Applicant urges that the problem of living polymer in the presence monomer is not appreciated in the prior art. The references disclose polymers forming in the presence of nitroxyl and monomer. Further, Foord, Hyde, and Lewis disclose the difference between true inhibitor nitroxyl and retarder inhibitor DNBP. While the references do not employ the word "living" to characterize the polymer impurity, the

conditions under which it forms are identical to Applicant's, thus the references are referring to the same problem addressed by Applicant.

The claims are broadly drawn, e.g., without specifying the amount of living polymer or it's molecular weight characteristic(s), the amounts of inhibitors, times and/or temperatures, etc. Accordingly they do not avoid encompassing the prior art and are not commensurate with purported showing(s) in the specification.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew A. Thexton whose telephone number is 571-272-1125. The examiner can normally be reached on Monday-Friday, 9:30 to 6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasudevan S. Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

M. A. Thexton

Matthew A. Thexton
Primary Examiner
Art Unit 1714